Respiratory Therapy Techniques

Oxygen therapy

All **critically ill patients should receive additional inspired oxygen on a 'more not less is best' philosophy.**

Principles

High flow, high concentration oxygen should be given to any acutely dyspnoeic or hypoxaemic patient until accurate titration can be performed using arterial blood gas analysis.

In general, maintain SaO_2 >90%, though preferably >95%. Compromises may need to be made during acute on chronic hypoxaemic respiratory failure, or prolonged severe ARDS, when lower values may suffice provided tissue oxygen delivery is maintained.

All patients placed on mechanical ventilation should initially receive a high FIO_2 until accurate titration is performed using arterial blood gas analysis.

Apart from patients receiving hyperbaric O_2 therapy (e.g. for carbon monoxide poisoning, diving accidents), there is no need to maintain supranormal levels of PaO_2.

Cautions

A *small* proportion of patients in chronic Type II (hypoxaemic, hypercapnic) respiratory failure will develop apnoea if their central hypoxic drive is removed by supplemental oxygen. However, this is seldom (if ever) abrupt and a period of deterioration and increasing drowsiness will alert medical and nursing staff to consider either (i) FIO_2 reduction if overall condition allows, (ii) non-invasive or invasive mechanical ventilation if fatiguing or (iii) use of respiratory stimulants such as doxepram. The corollary is that close supervision and monitoring is necessary in all critically ill patients.

A normal pulse oximetry reading may obscure deteriorating gas exchange and progressive hypercapnia.

Oxygen toxicity is described in animal models. Normal volunteers will become symptomatic after several hours of breathing pure oxygen. Furthermore, washout of nitrogen may lead to microatelectasis. However, the relevance and relative importance of oxygen toxicity compared to other forms of ventilator trauma in critically ill patients is still far from clear. Efforts should nevertheless be made to minimise FIO_2 whenever possible. Debate continues as to whether FIO_2 or other ventilator settings (e.g. PEEP, V_T, inspiratory pressures) should be reduced first. The authors' present view is to minimise the risks of ventilator trauma.

Monitoring

An oxygen analyser in the inspiratory limb of the ventilator or CPAP/BiPAP circuit confirms the patient is receiving a known FIO_2. Most modern ventilators have a built-in calibration device.

Adequacy and changes in arterial oxygen saturation can be continuously monitored by pulse oximetry and intermittent or continuous invasive blood gas analysis.